INDOOR AIR QUALITY MANAGEMENT PROGRAM

For The

H. M. Jackson Federal Building

Seattle, Washington

1997 (Revision 1 - 6/00)

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INDOOR AIR QUALITY MANAGEMENT PROGRAM

Jackson Federal Building

1. INTRODUCTION.

1.1 General. This program has been specifically developed for the H. M. Jackson Federal Building (JFB), 915 Second Avenue, Seattle, Washington**.** It's purpose is to provide an outline for the management of indoor building environmental conditions in an effort to help ensure the highest level of health, comfort, and well-being of both occupants and visitors. The program will also provide the guidance necessary to maintain a comfort range, which meets both government regulations and accepted industry standards in addition to ultimate acceptability to the majority of the building occupants.

Indoor air quality is a shared responsibility and this program represents a partnership between the GSA, occupants, and contractors in the commitment to provide a clean and safe environment. The program will meet it's goal through a holistic building system approach consisting of operation & maintenance of building equipment, minimization of pollutants, investigation of complaints, correction of verifiable problems and communications with occupants. GSA stresses prevention as the key in a proactive approach to acceptable building indoor air quality.

1.2 Background. Indoor air quality (IAQ) in a large building is the product of multiple influences such as design, usage, occupancy, furnishings, and layout. These influences and their interrelationships come together under the broad heading of IAQ.

Office building indoor air quality is largely unregulated. There are no federal regulations governing the low exposure levels of contaminants typically found in non-industrial buildings. The Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) regulate large-scale exposure typically found in industrial and manufacturing environments. However, no single federal agency has authority over IAQ in non-industrial buildings at this time.

Many of the current IAQ standards have been developed by the professional and scientific community and generally accepted by the building management industry. These standards and guidelines have been developed to meet the needs of the majority of building occupants. To date, there is no definitive consensus regarding building air quality that is widely accepted by the scientific and medical communities.

1.3 Distribution. This program is intended for wide distribution. It has been developed as both a guide for building management and as an educational tool for building occupants. A copy of this plan is available to anyone via the Internet at:

www.northwest.gsa.gov/jfb. Informational flyers are also posted on the corridor bulletin boards on each floor of the building.

1.4 Program Manager. The designated IAQ Program Manager for the Jackson Federal Building (JFB) is the assigned GSA Building Manager. (Refer to appendix A "Building Management List").

1.5 Definitions.

Allergen. A substance that induces an allergic reaction.

ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers). The professional organization recognized as the primary standard setting organization in the nation regarding HVAC and IAQ.

Asbestos. A fibrous form of mineral mined from naturally occurring rock formations. Known for it's ability to be very durable and incombustible, it was typically combined with other materials to produce many products used in building construction. The use of asbestos containing materials (ACM) in the U.S. was effectively banned by 1978 due to the realization of related health hazards. Current GSA policy is to maintain in place ACM which is in good condition, repair ACM which becomes damaged, and remove (abate) ACM impacted by major renovations.

Asbestos Management Program. A written GSA program developed specifically for the management of asbestos containing materials in a specific building or facility. (A GSA building management policy).

Asthma. A disorder of the respiratory system characterized by wheezing, difficulty in respiration and a feeling of constriction in the chest.

Bacteria. A one celled microscopic organism lacking chlorophyll, which occur in three main forms and may cause Disease.

Bake Out. Delivering the maximum quantity of outside air at the maximum temperature for a period of time to flush out contaminants from a given space after construction.

BRI (Building Related Illness). A term used to describe a clinically diagnosable illness whose symptoms can be identified and whose cause can be directly attributed to airborne building pollutants (e.g., Legionnaire's Disease and Pontiac Fever).

Contaminant. The physical, chemical, and biological agents which annoy or harm building occupants. (Also known as "pollutant").

Disease. A condition of the body in which there is incorrect function resulting from illness, ailment, or sickness generally caused by a pathogenic microorganism.

EPA (Environmental Protection Agency). The federal agency responsible for regulation and oversight of environmental issues.

Fungal. An organism that decomposes and absorbs organic material (e.g., mold and mildew).

HVAC (Heating, Ventilation, and Air Conditioning). The building system which conditions and delivers air to various parts of a building or facility. Conditioned air is that which has been cleaned, heated, cooled, humidified, or dehumidified to maintain an interior space within an established "comfort zone." (Also known as “tempered air”).

IAQ (Indoor Air Quality). The quality of inside building air which is a composite of air circulation, proper temperature/humidity range, and cleanliness.

IAQ Program Manager. The person designated by GSA with the overall responsibility of indoor air quality (IAQ) for a specific building or facility.

MSDS (Material Safety Data Sheets). Describes the physical and chemical properties of products, their physical and health hazards, and precautions for safe handling and use. (Required to be available on-site by OSHA under 29 CFR 1910).

MCS (Multiple Chemical Sensitivity). The development of adverse allergic reactions (sensitization) to a number of chemicals at low concentration levels. (At present, an area of considerable debate within the medical and scientific community).

NIOSH (National Institute for Occupational Safety & Health). The U.S. Department of Health and Human Services tasked with oversight of health issues.

Nuisance Complaint. Complaints regarding issues such as offensive odors, but do not cause a safety or health concern. (Building management action not normally required).

OSHA (Occupational Safety & Health Administration). The federal agency responsible for workers safety and health.

Pathogen. A disease producing microorganism. (e.g., hepatitis).

PCM (Phase Contract Microscopy). Counting the number of fibers by microscope. Provides the total fiber count, regardless of fiber type. (A standard IAQ test method).

Pollen. The fertilizing element of flowering plants which causes allergic reactions in susceptible individuals.

Pre-existing Condition. A physiological or medical condition independent of environment (i.e., asthma, allergy, diabetes, etc.).

Purge. Delivering the maximum quantity of outside air for a period of time to flush out contaminants after construction.

Radon. A naturally occurring chemical element in the form of an odorless, radioactive gas created by the disintegration of radium.

SBS (Sick Building Syndrome). A term used to describe a condition in which approximately 20% of the occupants in a facility report physical complaints which have no recognizable cause and which clear up once employees leave the building (e.g., headache, fatigue, eye, nose, or throat irritation or respiratory problems).

Significant Complaints. Complaints from several individuals which are common in nature and may indicate a problem area. (Requires building management action).

Stressors. The environmental, ergonomic, and psychosocial conditions which annoy or harm building occupants.

Virus. A microscopic infectious agent which replicates within cells of living hosts. (e.g., cold or flu).

VOC (Volatile Organic Compounds). Compounds which evaporate (off-gas) from the many construction materials, building furnishings, and office supplies/equipment, which are made with organic chemicals. (e.g., formaldehyde). In sufficient quantities, VOC's can cause eye, nose, and throat irritations, headaches, dizziness, visual disorders, and memory impairment. (At present, not much is known about what health effects occur at the levels of VOC's typically found in public and commercial buildings).

1.7 References.

American Academy of Allergy, Asthma & Immunology, www.aaaai.org.

Asthma and Allergy Foundation of America, www.aafa.org.

ASHRAE 55-1992 “Thermal Environmental Conditions for Human Occupancy.”

ASHRAE 62-1989, “Ventilation for Acceptable Indoor Air Quality.”

EPA/NIOSH Publication “Building Air Quality; A Guide for Building Owners and Facility Managers”. U. S. Government Printing Office, ISBN 0-16-035919-8. www.epa.gov/iaq/base/baqtoc.html.

EPA Publication "Targeting Indoor Air Pollution," www.epa.gov/iaq/pubs/targetng.html.

EPA Fact Sheet "Ventilation and Air Quality in Offices," www.epa.gov/iaq/pubs/ventilat.html.

EPA Publication "An Office Building Occupant's Guide to Indoor Air Quality," www.epa.gov/iaq/pubs/hpguide.html.
OSHA Standard 29 CFR 1910.1000, Table Z-1 “Exposure Limits,” www.osha.gov.

41 CFR 101, “Federal Property Management Regulations,” www.access.gpo.gov/nara/cfr.

2. PROBLEM PREVENTION.

2.1 General. Management of IAQ begins with prevention, which is considered to be the most advantageous overall approach. Controlling contaminants is the most widely accepted preventative measure and consists of source control, exposure control, ventilation, air cleaning, and communication.

2.2 Source Control. Source control is generally considered to be the best long-term strategy in the management of IAQ. Source control amounts to the limiting, removing, sealing, or otherwise modifying of the offending element. Unfortunately, removal of the source is often unrealistic or impractical.

The JFB successfully incorporates such source control methods as limiting the use of hazardous products, restricting smoking, exterior trash collection, and direct local exhaust (restrooms, cooking areas, and parking).

2.3 Exposure Control. Exposure control involves adjusting the work hours or work location of affected individuals to a less offensive environment. (This is sometimes the most effective method when dealing with an individual who has pre-existing conditions or sensitivities).

Exposure control is a strategy, which is most appropriately employed between the affected building occupant(s) and the employing agency. (e.g., relocation of the employee' workstation).

2.4 Ventilation. Ventilation can effectively be utilized to dilute or remove contaminants which have become airborne within the building. The current ASHRAE recommendation, Standard 62-1989 “Ventilation for acceptable air quality,” recommends a minimum of 20 cfm/person at an occupancy rate of 7 people per 1000sf of outdoor air.

The JFB’s HVAC system was designed and constructed to deliver a minimum of 20 cfm/person of outdoor air. Built-in sensors provide continuos sampling of carbon dioxide (CO_2) levels, which in turn provides an indication of outdoor air levels. The sensors are part of a self-correcting system, which drives the outdoor air intake dampers open should CO_2 levels elevate too high. Additionally, periodic random testing by maintenance employees with “flow hood” measurement devices assure this standard is maintained.

2.5 Air Cleaning. HVAC air cleaning is generally a combination of devices utilized to reduce the concentration of airborne contaminants such as microorganisms, dusts, fibers, and other respirable particles. Common building HVAC air-cleaning systems include electrostatic filters, paper/fiber/cloth medium filters, and HEPA filters. Outdoor air, which is drawn into buildings, contains numerous pollutants and requires cleaning prior to delivery to occupants. (Special mention should be made that the term "outside air" is used in lieu of "fresh air" throughout this plan because outside air is not always

fresh). Typically, buildings located within metropolitan or industrial environments require more filtering/cleaning than those located in suburban or rural areas. The JFB utilizes a dual filtering system (refer to section 3.5 “Filtration”).

2.6 Communication. As noted in the introduction to this plan, maintaining acceptable IAQ is a shared responsibility. IAQ related communication with building occupants is accomplished through a variety of methods such as the building web site, corridor bulleting boards, and e:mailed "News Flashes."

3. BUILDING DESIGN.

3.1 General. The JFB is a landmark in the Central Business District of the city of Seattle. It is also the largest federal government owned building in the Pacific Northwest and considered the "flagship" of GSA Region 10.

The JFB occupies one full block between Second Avenue on the east, First Avenue on the west, Marion Street on the south, and Madison Street on the north.

3.2 Building Statistics.

Completion Year:	**1974**	**Renovation Year:**	**1997 (HVAC)**
Construction Type:	**Type 1 Fire Resistive**	**Occupancy Class:**	**Group B**
Total Square Feet:	**822,000**	**Occupiable S F:**	**714,060**
Number of Stories:	**37 above 1 below**	**Parking:**	**36**

3.3 Design. The basic structure is constructed with a concrete encased fire resistive steel frame and concrete slab floors. The exterior shell consists of precast concrete panels with single glazed windows in operable aluminum sash. (Building policy prohibits opening of windows to help curb the introduction of contaminates). Interior walls are constructed of metal stud covered with gypsum wallboard.

3.4 Construction Materials. The original construction materials met the design requirements existing at that time. However, several of the original construction materials are now considered hazardous. (e.g., various types of floor tile, insulation, and adhesives).

3.5 Environmental Hazards. Interior finishes are sometimes known to cause discomfort to individuals with pre-existing conditions. Interior finishes within the JFB that could cause discomfort to certain sensitive individuals include:

- **Ceiling tile,**
- **Carpet tile & adhesive,**
- **Carpet base & adhesive**
- **Vinyl floor tile & adhesive**

3.5.1. Asbestos. GSA maintains a written asbestos management plan specifically for the JFB. All maintenance, repair, or alterations which impact asbestos containing materials will follow the asbestos management plan. Some areas within the building are comprised of asbestos containing materials such as pipe insulation, floor tile, and sprayed on fireproofing (the underside of floors 6-31).

3.5.2 Lead. GSA maintains a written lead management plan specifically for the JFB. All maintenance, repair, or alterations, which impact the lead containing materials, will follow the lead management plan. Some coatings (paint) within the building contain small amounts of lead.

3.5.3 Radon. Radon testing was accomplished both prior to the comprehensive renovation and again after completion. All testing indicates that radon levels are within acceptable limits as recommended by the U.S. Environmental Protection Agency (EPA).

JFB radon test results (1989): 0.0-3.4 pCi/L

EPA recommends that radon levels be maintained below 4 pCi/L. (EPA's recommendations are geared for homes - there is no recommendation for office buildings at this time). Elevated radon levels are typically controlled through the use of direct local exhaust of the affected area).

4. HVAC DESIGN.

4.1 General. The purpose of a heating, ventilation, and air conditioning (HVAC) system is to control environmental conditions within a space to benefit people, products, or processes. The HVAC system treats the air to simultaneously control temperature, humidity, cleanliness, and distribution for comfort.

4.2 HVAC Statistics.

System:	**Dual duct,** **Variable air volume** **(Converted from constant air volume in 1997)**
Fans:	**Office supply, 14 each, 20 hp to 300 hp** **Office return, 14 each, 10 hp to 75 hp** **Special exhaust, 17 each, 1 hp to 40 hp**
Heating:	**Hot water system**
Cooling:	**Chilled water system** **R1&R2, 2 each, 975 ton, centrifugal type chillers** **R3&R5, 2 each, 200 ton, screw type chiller**
Filtration:	**Prefilters (30% efficiency)** **Final filters (85% efficiency)**
Control:	**Multi-zone** **Computerized control**
Zones:	**Floors 1-5, Floors 6-7, Floors 8-13, Floor 14, Floors 16-23, Floors 24-31, Floors 32-35**

4.3 Design. The JFB utilizes a large central air handling system to provide conditioned air to the occupied spaces. The main flow of conditioned air is both supplied and exhausted through diffusers built into the light fixtures within the suspended ceiling on floors 1-35.

A supplementary system consists of perimeter vent units (located along the exterior walls) on floors 6-35, which are utilized to assist with distribution and tempering of air, supplied by the ceiling distribution system. Floors 1-5 have perimeter fan coil units, which contain both heating and cooling elements and are occupant controlled. (Both air flow and thermal level).

4.4 Air Handling. Outdoor supply air is drawn into the building at the *(information deleted for security reasons)* floors for filtering and conditioning (heated or cooled). This conditioned supply air is then ducted to zoned variable air volume (VAV) boxes. The VAV boxes maintain thermal comfort by varying both the temperature and the amount of conditioned air delivered to occupiable space. (VAV boxes are designed and operated to remain above a predetermined minimum airflow to ensure adequate air quality). Final delivery of supply air is accomplished through ducting from the VAV boxes to

diffusers built into lighting fixtures located within the suspended ceiling. Return air is routed through other non-supply air light fixtures into a plenum (space) above the suspended ceiling and either recirculated as conditions dictate or exhausted out of the building.

4.5 Filtration. Supply air filters are of paramount importance to any HVAC system. Filters are designed to remove particulates such as dirt, dust, soot, and insects from incoming outside air. The primary JFB filter system utilizes a two-stage dry media filtration concept to clean the incoming outside air. The first stage of filtration consists of lower efficiency prefilters (approximately 30% based upon particulate size). These disposable filters are composed of antimicrobial treated fiber mat (24"x24"x2") and are changed when pressure differential measurements indicate the need. The second stage consists of higher efficiency final filters (approximately 85%). These disposable bag type filters are composed of hydrophobic fiber mat (24"x24"x21") and are also changed when pressure differential measurements indicate the need. The number of filters per supply air fan, for office areas, varies from 20 to 140 each.

4.6 Heating. The JFB utilizes a hot water heating system. High-pressure steam is purchased locally and along with a supplemental system of ten electric boilers produce the hot water required to heat the building. The hot water is piped into the mechanical spaces where it is distributed to the heat exchanging coils within the supply air stream to the VAV boxes and ultimately to occupied space. Heat is also obtained from lights, occupants, equipment, and solar infiltration.

4.7 Cooling. The JFB utilizes a chilled water cooling system. Chilled water refrigeration machines, located in the 36th floor mechanical room, provide cooling for the supply air. A condenser loop (heat return piping) to four induced draft cooling towers located on the roof where waste heat is rejected to the atmosphere completes the heat removal process.

4.8 Zoning. The JFB is divided into seven distinct HVAC zones, which is comprised of one to several adjoining floors. One or more ceiling or wall mounted digital thermostats tie into a VAV box, which senses the need for heating or cooling in that specific area. It should be noted that each individual office is not separately controlled, which can occasionally be the source of disagreement where more than one occupant occupies the same zone or an occupant crosses zones. Additionally, occupants may experience airflow disruptions due to wall construction from agency requested office alterations. (The building was originally designed as an open office concept. However, many occupants have constructed interior walls, which in turn can restrict airflow.).

4.9 Control. Overall HVAC system control is achieved through a distributed intelligence network. The building automation system (BAS) utilized in the JFB is the *Johnson Controls "MetaSys"* (a direct digital system, installed in 1997, which replaced the original *Honeywell* hardware and *Pegasus* software system). *"MetaSys"* automatically maintains building environmental conditions. (With the exception of the perimeter fan coil units on floors 1-5 which are manually controlled at the unit).

GSA Building Engineers are able to collect information from field hardware and make adjustments throughout the building from the building control center if necessary. The Building Engineers carry pagers on a round-the-clock basis that provides notification should any of the critical systems malfunctions. The GSA Regional FPS Control Center also monitors the critical systems on a 24-hours/7 day basis.

4.10 Special Ventilation. Special use areas such as restrooms, machinery rooms, loading dock, parking garage, and kitchen have separate exhaust systems that exhaust inside air directly outside of the building (no recirculation).

Isometric drawing of building with locations of supply, cooling towers, and exhaust

(Drawing available only in Official GSA Building Management copy for security reasons)

5. OPERATION & MAINTENANCE.

5.1 General. Studies have indicated that many verifiable IAQ problems can stem from inadequate HVAC system operation and maintenance. All GSA managed buildings have written HVAC operation and maintenance guidelines.

The JFB is operated and maintained by a GSA maintenance work force. Only minimal amounts of highly specialized work are contracted out to the commercial sector. (Information pertaining to the contractor is listed in Appendix A "Building Management List").

5.2 Equipment Operations. The building HVAC equipment is operated in accordance with a combination of standardized GSA requirements, equipment manufacturer's recommendations, and accepted industry practices. The timing of operations is further tailored to meet the actual hours of occupancy to help ensure building air is conducive to occupant activities. Equipment is started approximately 30 minutes prior to the start of standard building operating hours and shut down approximately 30 minutes afterward. (Standard building operation hours for the JFB are 6:30 AM - 5:30 PM, Monday through Friday, excluding federal holidays).

GSA has informed the Heads of occupant agencies that allowing employees to work in the building outside of standard building operating hours can place employees in an unhealthy environment. Such agencies have been encouraged to purchase overtime utilities (HVAC and lighting) via the established Reimbursable Work Authorization (RWA) program.

5.3 Equipment Maintenance. The building HVAC equipment represents a substantial investment by the government and must be treated accordingly. Proper maintenance ensures that equipment life cycles are maximized. The GSA building maintenance staff is charged with equipment maintenance.

5.3.1. Preventative Maintenance. Preventative maintenance (PM) is the inspecting, adjusting, lubricating, and cleaning of equipment that helps prevent breakdown or premature failure of equipment. Copies of GSA PM guides for major HVAC equipment can be found under Appendix D "HVAC Preventative Maintenance Guides."

5.3.2. Service Calls. GSA maintains a computerized service call program utilizing "*Maximo"* software which tracks all reported environmental and thermal comfort issues. This program is just one of the many management tools utilized by GSA to help insure occupant comfort. Occupants are encouraged to notify GSA of any building related malfunctions including thermal comfort issues by calling the GSA Service Call Hot Line on 206-220-5050 (24-hour/7 day).

5.4 Renovation/Alteration/Construction. Most buildings are in a constant state of alterations due to repairs, modernization, and tenant initiated changes. These alterations can lead to the introduction of a variety of contaminants.

As conditions dictate and to the extent practical, GSA and its contractors shall employ the following work practices to reduce contaminants:

- **Minimize use of VOC containing materials,**
- **Accomplish work during non-normal building occupant work hours,**
- **Shut down and secure the HVAC system,**
- **Isolate work area with dust barriers,**
- **Exhaust the work area directly to the outside,**
- **Purge (flush) the area prior to occupancy,**
- **Bake out the area after completion of all work,**
- **Accomplish an extensive post construction cleaning.**

5.5 Custodial. Custodial practices typically have a significant impact on those building occupants who have pre-existing condition (i.e., allergies, disease, illness, etc.). Dust and respirable particles are introduced by both incoming outside air and occupant activities within the building. Basic custodial practices such as dusting and vacuuming help control such particulates. However, it should be noted that cleaning/dusting of occupant workstations is the responsibility of occupant agencies.

The contractor responsible for custodial work at the JFB is listed in Appendix A “Building Management List."

5.6 Pest Control. The GSA philosophy regarding pest control is also one of a preventative approach rather than reactive. It is also the policy of this program not to allow the on-site storage of pesticides within the building.

GSA, in cooperation with its client agencies must practice good sanitation practices to discourage the attraction of pests into the building. Rodent control measures are taken if sightings of rodents and/or droppings are reported. Glue traps are utilized for rodents reported in occupied space and bait boxes are utilized for rodents reported in non-occupied space. The materials used for rodent control are not known to cause health concerns, under normal use, to building occupants.

Pest control for the JFB falls within the contractual obligations of the custodial contractor. The custodial contractor sub-contracts to a licensed professional pest control firm due to the specialized nature of the work.

5.7 Accidents. In the event of an accidental spill or release of hazardous chemicals within the building the following actions will be considered:

- **Partial or full evacuation of occupants,**
- **Containment by building personnel or special HAZMAT Team,**
- **Clean up by building personnel or special HAZMAT Team,**
- **Increased building HVAC exhaust,**
- **Special supplemental local exhaust.**

5.8 Annual Sampling. GSA contracts for annual air quality sampling throughout the occupied spaces by an independent party to help ensure the proper environment is being maintained. Items typically sampled include temperature, humidity, and carbon dioxide. (Refer to Appendix I "Common Sampling Procedures").

5.9 Hazard Communication. Typical building maintenance occasionally requires the use of products, which contain chemicals that could cause discomfort or harm to users or occupants if used incorrectly.

Building management maintains an inventory, updated annually, of all chemical products used within the building. (Refer to Appendix F “Hazardous Chemical Inventory”). This inventory includes products used by GSA, contractors, and occupant agencies within the building.

Each product listed on the Hazardous Chemical Inventory has a corresponding Material Safety Data Sheet (MSDS). Occupants should contact their agency representative for access to MSDS.

6. BUILDING OCCUPANTS.

6.1 General. Numerous federal agencies occupy the JFB. There are also several conference/training rooms, which are utilized by both governmental agencies and the general public. Due to the nature of services provided by many of the occupant agencies, there are also a substantial number of walk-in visitors on any given day.

6.2 Occupant Statistics:

Average number of occupant agencies:	**35-40**
Average number of individual occupants:	**2,300-2,400**
Average range of visitors per day:	**700-1200**

6.3 Susceptibility. Some building occupants are more susceptible to indoor air quality discomfort than others. Factors relating to increased susceptibility include pre-existing conditions such as disease and allergies while others include age, illness, tobacco smoking, and contact lens use. Individuals who experience problems, due to pre-existing conditions or increased susceptibility should consult a physician. It should also be noted that HVAC filter systems will not remove chemical vapors, odors, or viruses such as the flu or common cold.

6.4 Tolerance. Each individual building occupant has a different thermal comfort zone (temperature and humidity level). Just as importantly, each has a different tolerance level for contaminants and chemicals.

Its not feasible to provide a comfort level that meets the requirements of each and every individual occupant. The best that can be achieved is to reach a range, which is acceptable to the majority of occupants. Although it is the intention of GSA to make all occupants as comfortable as possible, unusual adjustments or modifications to meet special needs of specific individuals cannot normally be accommodated.

Individuals must also assume responsibility for their own thermal comfort. Building temperatures are maintained within a range and beyond that personal clothing should be adjusted to maintain comfort. (Window coverings are also an appropriate method of adjusting comfort levels). GSA strives to maintain a comfort range by following established GSA policy (41 CFR 101-20.107) and industry recognized standards such as those published by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE).

7. OCCUPANT ACTIVITIES.

7.1 General. The building is used primarily for administrative purposes and the interior is configured as office space. The majority of occupants are General Schedule employees, which are primarily engaged in sedentary work. The generation of interior pollutants is considered minimal.

7.2 Pollutant Minimization (building management). Building management practices can have a significant impact concerning the control of pollutants. Some products utilized in routine maintenance introduce a variety of chemicals to the building environment. All such products used in the JFB will be utilized in accordance with the manufacturer's recommendations. Additionally, all such products will be listed on the Annual Hazardous Chemical Inventory (refer to Appendix F "Hazardous Chemical Inventory") and will have the associated Material Safety Data Sheets (MSDS) on site.

To the extent possible, GSA and its contractors will employ the following work practices to minimize pollutants:

- **Utilize "green products",**
- **Minimize the use of potentially offensive chemicals,**
- **Minimize the on-site storage of chemicals,**
- **Utilize chemicals during non-standard building hours (after 5:30 PM).**

7.3 Pollutant Minimization (building occupants). Occupants themselves can be a contributor to the pollution of indoor air. Occupant equipment such as photocopy machines, computer printers, shredders, and facsimile machines in addition to office products such as *Whiteout* and felt tip pens are a few of the known pollutants. Occupant furnishings such as workstations, partitions, chairs, and plants can also cause discomfort. Building occupants are requested to minimize the following:

- **Use of personal grooming products with strong odors,**
- **Disposing of food waste in office trash cans,**
- **Reporting to work while ill,**
- **Blocking air vents,**
- **Over watering plants,**
- **Smoking.**

7.4 Stressors. Stressors are the psychosocial, environmental, and ergonomic conditions, which annoy or harm building occupants. The results of stressors can be mistaken for contaminated air. Additionally, stressors can produce an increased sensitivity to contaminants.

Environmental	Psychosocial	Ergonomic
Lighting level	**Over crowding**	**Workstation comfort**
Noise level	**Personnel conflicts**	**Video display terminals**
	Labor/mgt conflicts	**Keyboard use**

8. PROBLEM RESOLUTION.

8.1 General. IAQ complaints can be quite difficult to diagnose and there is no single "cure all" procedure for resolving IAQ problems. Therefore this plan contains no packaged correction checklist. Most resolution efforts will generally attempt to define the complaint area, timing patterns, and symptom patterns through a process of interviews, site investigation, and sampling. Resolution often requires a team effort of building management and occupants efforts.

8.2 Occupant Responsibility. It is the responsibility of individual occupants to report suspected problems to GSA. Suspected problems will be documented and investigated in accordance with section 8.3.1 "Complaint System."

Occupants can further assist in air quality management through participation on agency safety and health committees. These committees help by acting as a clearinghouse for complaints. Additionally, occupants can also help by maintaining diaries, which assist with complaint investigations.

8.3 GSA Responsibility. It is the responsibility of GSA to investigate or arrange for others to investigate suspected problems. In accordance with 41 CFR 101 "Correction of Hazardous Conditions," GSA will promptly correct building conditions causing health problems. GSA will also maintain a written IAQ complaint program to assist in the mitigation of actual or perceived IAQ problems.

8.3.1 Complaint System. A written complaint program is of paramount importance to this management program. The mitigation process cannot take place unless building management has been made aware of occupant concerns.

An IAQ complaint log will be maintained under this program and incorporated into the documentation as described in Section 8.7 "Record Keeping." This log will not however be utilized to record hot or cold calls. Hot or cold calls will be handled in accordance with Section 6.3.2 "Service Calls."

8.4 Investigation. Investigative strategies must be chosen on a case-by-case basis, however, most investigations will begin with interviews of complainants.

8.4.1 Complainant Interviews. Investigators will interview individual complainants and if the situation dictates, other occupants in the general area. In some instances the use of occupant diaries can help establish a possible link between occupant discomfort and building maintenance activities.

Investigators will typically search for information regarding the following questions:

- **Do symptoms appear shortly after entering the building,**
- **Do symptoms disappear or decrease after leaving the building,**
- **Do symptoms occur during a certain time of day or on certain days,**
- **Are there multiple complainants with similar problems,**

- **Are there several generalized symptoms such as a combination of difficulty breathing, stuffy nose, headache, dizziness, irritated eyes, nose, or throat, fatigue, or nausea,**
- **Is complainant under doctors care or using medication,**
- **Is complainant exposed to unusual hazards or activities at home.**

8.4.2 Site Investigation. Investigators should walk through the site looking for an obvious contaminant source along with a recognizable contaminant pathway.

Investigators will typically search for information regarding the following questions:

- **Are there any unusual occupant activities underway,**
- **Is there construction in progress,**
- **Has custodial changed procedures or cleaning compounds,**
- **Has occupant agency installed new furniture,**
- **Is there signs of moisture infiltration.**

8.4.3 Equipment Investigation. Improper operation or malfunction of HVAC equipment is another possible cause of poor IAQ. Equipment should be inspected for proper operation (filters are especially suspect).

8.4.4 Sampling. Generally, the investigative techniques previously described will be exhausted prior to laboratory testing and analysis. The pollutant levels typically discovered from sampling are usually far below any regulated levels and therefore of questionable use in an IAQ problem investigation.

However, should investigation indicate that sampling be conducted, GSA will normally contract the services of an independent industrial hygienist and results documented in appendix H "Sampling Report Results."

8.5 Diagnoses. A diagnosis of an IAQ problem is generally the most difficult part of the entire process. The following indicators are commonly utilized in the evaluation of IAQ concerns:

Comfort indicator. Many perceived IAQ problems are often thermal comfort issues. Measurements of temperature and humidity are generally a good indication of occupant comfort level. The current ASHRAE standard (55-1991) recommends an average winter temperature of 71^{o} f with a range of 68^{o} f - 75^{o} f and an average summer temperature of 76^{o} f with a range of 73^{o} f - 79^{o} f. Humidity levels should fall within the 30%-60% range.

Ventilation indicator. Measurement of carbon dioxide (CO_2) levels is generally a good indication of the amount of outdoor air being introduced into the building. Occupants expire CO_2 as a natural part of the breathing process so a build up of CO_2 generally indicates a lack of adequate outdoor air. Carbon dioxide levels in outdoor air average 350-450 ppm. Carbon dioxide levels of 600-1000 ppm may indicate inadequate outdoor air (levels above 600 ppm will initiate action by Building Management). The current

ASHRAE standard (62-1989) recommends carbon dioxide levels remain under 1000 ppm based on 7 people per 1000 square feet of space.

Distribution indicator. Measurement of airflow at HVAC supply diffusers is generally a good indication of distribution. The current ASHRAE standard (62-1989) recommends 20 cfm per person of outdoor air in office and conference room settings. (Currently 41 CFR 101 requires a minimum of 5 cfm per person of outdoor air).

Air borne contaminant indicator. Measurement of air borne contaminants is generally not beneficial unless investigation indicates a problem of high levels. The levels of contaminants typically measured in office environments are far below any regulated levels.

Once the results of an investigation have been collected and analyzed, a determination of air quality should be possible along with a hypothesis for resolution.

- **If a correctable problem has been verified, GSA will expeditiously pursue a corrective course of action,**
- **If investigation indicates that building air is within acceptable levels and a verifiable problem cannot be uncovered, building management will continue to work closely with occupants to reach a mutually agreeable resolution,**
- **If investigation indicates that building air is within acceptable levels and the condition is more of an individual nature, GSA will forward the issue to the occupant's agency for accommodation.**

8.6 Correction. GSA will develop a plan, including time frames, for correction of problems once a cause has been identified and a solution devised. Building occupants will be kept informed of progress through any combination of agency liaisons, group meetings, newsletters, or posted notices.

8.7 Record Keeping. Results of complaints, investigations, sampling, and corrective actions will be documented and included in this program under the appendices. Documentation shall be made available for review to building management personnel, investigators, and building occupants.